

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO A WALL CONSTRUCTION FOR A VAULT AND THE LIKE

(71) I, GERHARDUS VAN DIJK, a subject of the Queen of the Netherlands, of Willem de Zwijgerlaan 70, Santpoort-Zuid, the Netherlands, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a wall construction destined for a vault or the like space, provided with at least two concrete layers successive in wall thickness direction.

In this connection it should be understood by wall any possible boundary wall or part thereof, in particular also the floor, the roof, exceeding 1500°C may be employed herein.

It is the object of the invention to provide a wall construction of the above-mentioned type which offers security against the above-described techniques nowadays employed in burglaries.

To this effect such wall construction according to the invention is characterized in that between said concrete layers there is present a hollow space with a comparatively thin dividing layer bounding said space at least at the outer cavity side, said layer comprising material which remains not-flowing and strongly heat-insulating at very high temperatures and comprising a sensor a door and the like of such spaces.

As a result of modern burglary techniques using in particular explosives, drills and thermic lances, it has become difficult for the hitherto known wall constructions to provide sufficient protection against burglary or such like violence.

When using explosives often plastic bombs are utilised, which are applied on the outer side. Particularly effective for the drilling is especially the application of thermic lances by means of which holes are formed as a result of very high local heating so that material such as steel and concrete become liquid or are scattered. Temperatures far

incorporated in said dividing layer forming part of an alarm system and able to actuate said alarm system upon contact, heating or other interference.

In order to obtain a still greater security, the hollow space in a further embodiment of this principle may be bounded also at its inner side by such heat-insulating dividing layer of the same type as that bounding its outer side, so comprising material which remains non-flowing and strongly heat-insulating at very high temperatures, preferably likewise having a circuit incorporated therein and forming part of an alarm system.

When furthermore a delivery water piping is connected to the hollow space, such wall construction is highly protected against application of the above-mentioned techniques, either separately or also in combination, as will be explained in the following.

In case, against the outer side and/or down to some depth there is applied in the outer concrete layer or "skin", an explosive charge which is brought to explosion, the effect of such charge will be mainly limited, through the presence of said hollow space, to said outer skin. Furthermore the alarm system naturally then becomes operative while, when in accordance with the preferred embodiment, there is connected a delivery water supply to the hollow space, the installation of another explosive charge for destroying the next concrete layer is practically impossible because of the water flowing with considerable force from the formed hole.

If it is tried to drill in the invented wall construction — which naturally can be impeded by applying maximally hard concrete types, at any rate for the outer skin — the alarm circuit is likewise attained at a given moment. In accordance with the preferred embodiment, with the connection of a water supply under high pressure to the hollow

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space, moreover, when the drill point has reached the cavity, the water emerging under pressure will substantially prevent any further drilling operation. In particular it is thereby excluded that an explosive charge can be applied yet in the drill hole. The water pressure may be e.g. 5 atmosphere or higher.

For small vaults it may in general be sufficient to connect the hollow space to the water piping having sufficient pressure to attain the contemplated above-described effect.

In case larger vaults are concerned, a special delivery water system, e.g. a water cellar underneath the vault and a pump, will provide a rapid and powerful water supply. Preferably to this effect according to the invention there is employed a water supply valve incorporated in the delivery water supply piping, which valve is responsive to the actuation of the alarm system by interfering with the sensor incorporated in the heat-insulating dividing layer.

If it is tried to perforate the invented wall construction by means of a thermic lance, then at a given moment when the hole in the outer concrete skin is deep enough, the insulating dividing layer adjacent the outer side of the hollow space will be attained. Because this is not flowing however and strongly heat-insulating, such a layer, even when it is comparatively thin, constitutes an effective impediment for further penetration of the thermic lance.

For such heat-insulating dividing layers may be chosen various materials, e.g. asbestos cement layers, especially also a number of superimposed layers of such material. According to the invention the heat-insulating dividing layers may also be formed in particular by a plurality of layers of wood with an alarm circuit therebetween. In such case the total wood thickness should be such that the layer upon the carbonization thereof by the very high temperatures because of the use of thermic lances, ensures the desired strongly heat-insulating properties.

As already observed in the above, preferably very hard concrete is employed, especially for the outer concrete layer or layers, for which purpose concrete having polymer aggregate is highly suitable because it is highly drill-resisting.

One embodiment of a vault wall construction according to the invention will now be described by way of example, with reference to the accompanying drawing.

Figure 1 is a vertical cross section of a vault having surrounding walls and a door constructed in a wall construction according to the invention and having underneath the vault a schematically indicated cellar with delivery pump for supply of water under pressure to the hollow space between the

concrete layers of the vault walls;

Figure 2 shows on an enlarged scale, detail II in Figure 1, of the vault door.

According to the embodiment exclusively shown by way of example, there is generally indicated a vault having the reference numeral 1. Around, so as regards all side walls, the upper wall and the lower wall, the wall construction contains two hard concrete layers, of which the outermost is indicated by reference numeral 2 and the innermost by numeral 3. The vault door generally indicated by numeral 4 also comprises these layers. These are indicated respectively by numeral 2' and 3'. Moreover the vault door is provided with a steel outer skin 5 and a steel inner skin 6, for which reference is made in particular to Figure 2.

Between the concrete layers 2 and 3, respectively 2' and 3', there is a hollow space 7, 7' which is confined on either side by strongly heat-insulating divided layers, of which the one at the outer side is indicated by 8 (respectively 8') and the one at the inner side by 9 (respectively 9'). These dividing layers comprise in the present embodiment laminated layers of wood wherein, between two of said layers, there is incorporated an alarm circuit in each insulating dividing layer 8 and 9 (respectively 8' and 9'). This is only drawn for the door in Figure 2', the alarm circuits for respectively the dividing layers 8' and 9' being indicated by numerals 10' and 11'.

Said alarm circuits 10' and 11', and also the alarm circuits for the inner and outer dividing layers which bound the hollow space between the concrete layers of the rest of the vault wall portions, form part of an alarm system, not shown, having an alarm signal which is actuated upon contact, heating and/or other external influences of one of the said alarm circuits.

Between concrete layers 1 and 2, respectively 1' and 2', there are disposed spacers 12, 12'. The thickness dimension measured in wall thickness of the hollow space may be chosen in function of the type of vault.

Figure 1 furthermore shows by broken lines underneath vault 1 another cellar 13, wherein there is installed a pressure pump 14 for supplying, via valve 15 in a supply passage 16, a sufficient quantity of pressurised water to hollow spaces 7, 7' as soon as the alarm system is actuated through interference of one of the alarm circuits 8, 9, 8', 9', to which effect said valve 15 is suitably coupled to the alarm system.

The hollow space 7' in the door is connected by means of one or more high pressure hoses 17 to the hollow space 7 in the fixed vault walls.

In the hollow space 7, 7' are shown steel spacers 12, 12' between the heat-insulating dividing layers 10 and 11, respectively 10' 130

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and 11'. The spacers 12 are only shown for a part of the fixed vault walls but naturally are present on all sides.

Although the depicted succession of two concrete layers, of which at least the outer layer is made of special hard concrete with there-between the hollow space confined on either side by a heat-insulating layer comprising an alarm circuit, offers a proper protection, it is naturally also possible to apply more concrete layers with further hollow spaces and heat-insulating layers when a very high degree of safety is required and in particular when it concerns vault constructions that are installed in remote places.

In particular it is also possible not to separate further inwardly disposed concrete layers by a hollow space but only by a heat-insulating dividing layer of the above-described type, whether or not including an alarm circuit of the alarm system.

Likewise all kinds of variants are possible within the scope of the invention with respect to the embodiment shown in the drawing and described in the foregoing.

WHAT I CLAIM IS:—

1. Wall construction destined for a vault or the like space and provided with at least two concrete layers successive in wall thickness direction, characterised in that between said concrete layers there is present a hollow space with a comparatively thin dividing layer bounding said space at least at the outer cavity side, said layer comprising

material which remains not-flowing and strongly heat-insulating at very high temperatures and comprising a sensor incorporated in said dividing layer forming part of an alarm system and able to actuate said alarm system upon contact, heating or other interference.

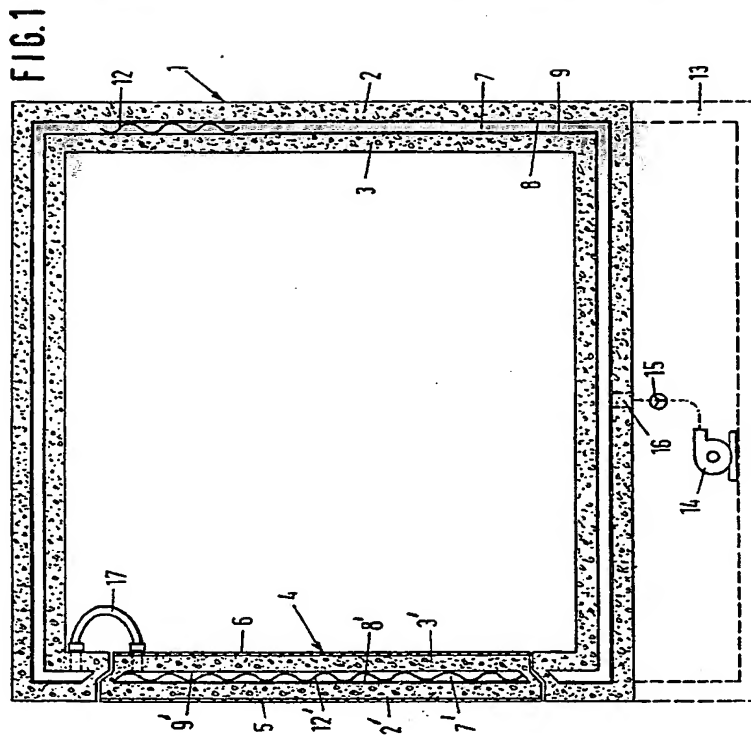
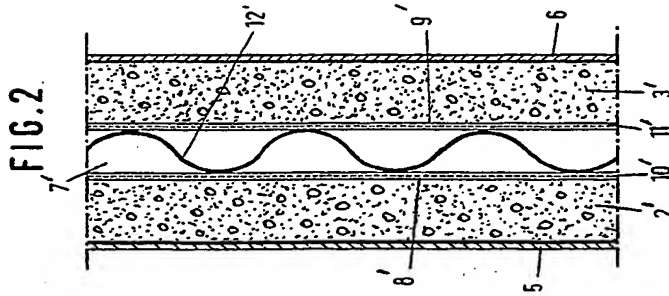
2. Wall construction according to Claim 1, characterised in that the hollow space is bounded at its inner side by a heat-insulating dividing layer of the same type as that bounding its outer side.

3. Wall construction according to any one of the preceding claims, characterised in that there is connected to the hollow space a delivery water piping comprising a water supply valve responsive to the actuation of the alarm system by interference with the sensor incorporated in the dividing layer.

4. Wall construction according to any one of the preceding claims, characterised in that the or at least one of the abovementioned insulating dividing layers comprises a plurality of layers of wood with an alarm circuit incorporated therebetween.

5. Wall construction substantially as described herein with reference to the accompanying drawings.

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